Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:2160908 Date:06-07-2023

Subject Name:Electrical Power system – II

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is importance of receiving end power circle diagram? Explain the steps of constructing it.	**03**
	(b)	Write a brief note on capacitance switching.	**04**
	(c)	Derive the ABCD constants for medium transmission line using Nominal T representation. Also write the expressions for voltage regulation and efficiency for the same line.	**07**
Q.2	**(a)**	Explain the sub-transient, transient, and steady state reactance.	**03**
	(b)	What are series reactors? How are they classified.	**04**
	(c)	Distinguish between symmetrical and unsymmetrical faults. How symmetrical faults are analyzed?	**07**
		OR	
	(c)	Explain the Equivalent Circuit model of Synchronous machine? Also draw the equivalent circuit diagram.	**07**
Q.3	**(a)**	Give reason: The analysis of unsymmetrical faults can be more easily done with the help of symmetrical components than by a direct solution of the unbalanced circuit.	**03**
	(b)	Show that symmetrical component transformation is power invariant.	**04**
	(c)	Explain the zero-sequence impedance of transformer for various connections.	**07**
		OR	
Q.3	**(a)**	Why does a generator produce only positive sequence voltage? Discuss.	**03**
	(b)	State the frequency of zero sequence phasors. Describe the applications of symmetrical components.	**04**
	(c)	State the frequency of zero sequence phasors. Describe the applications of symmetrical components.	**07**
Q.4	**(a)**	Give reason: for a fault at alternator terminals, a single line to ground fault is generally more severe than a 3-phase fault.	**03**
	(b)	derive the equation for a line-to-line fault in a power system with fault impedance of Z_f.	**04**
	(c)	Explain traveling and reflecting waves on transmission line with open end at the receiving.	**07**
		OR	

Q.4	**(a)**	Write a brief note on overvoltage due to arcing ground.	**03**
	(b)	Give reason: A travelling wave suffers reflection when it reaches discontinuity.	**04**
	(c)	Explain the phenomena of corona. Also discuss the measures taken to control corona in EHVAC transmission lines.	**07**
Q.5	**(a)**	Write short note on radio interference.	**03**
	(b)	How can corona loss be calculated? What is the meaning of roughness factor?	**04**
	(c)	A 3-phase. 50-Hz overhead transmission line 100 km long has the following constants. Resistance/km/phase = 0.1 Ω Inductive reactance/km/phase = 0.2 Ω Capacitive susceptance/km/phase = 0.04 × 10 -4 siemen Determine (i) the sending end current (ii) sending end voltage (iii) sending end power factor and (iv) transmission efficiency when supplying a balance load of 10,000 kW at 66 kV p.f 0.8 lagging . Use nominal T method.	**07**
		OR	
Q.5	**(a)**	The currents in three phase unbalanced system are IR = (12 + j6) A, IY = (12 - j12) A, IB = (-15 + j10) A. The phase sequence is RYB. Calculate, positive, negative and zero sequence components of currents.	**03**
	(b)	Find the disruptive critical voltage and visual corona voltage (local as well as general corona) for a 3-phase 220 kV line consisting of 22.26 mm diameter conductors spaced in a 6 m delta configuration. The following data can be assumed: Temperature 25° C, pressure 73 cm of mercury, surface factor 0.84, irregularity factor for local corona 0.72, and irregularity factor for general (decided) corona 0.82.	**04**
	(c)	Starting from the first principles, show that surges behave as travelling waves. Find expressions for surge impedance and wave velocity.	**07**